PHILIPS

PM 6622

9446 066 220.1

Operating manual

PM 6624

9446 066 240.1

PM 6625

9446 066 250.1

760615/1

Ordering number of this manual
9499 460 08611

IMPORTANT

In correspondence concerning this instrument, please quote the type number and the serial number as given on the type plate on the rear of the instrument.

Printed in Sweden / Irkå-Tryck AB

VI. OPERATION
General Information

1. Switch on power

1.1. Mains

Before the counter is connected to the mains check that the mains transformer is wired for the local mains voltage as described in chapter IV.1. Mains voltage conversion

— Set switch MAINS EXT. BATT/INT. BATT on the rear panel to position MAINS EXT. BATT.
— Connect the mains cable to input socket for the mains at the rear panel.
— Set DISPLAY TIME control at the front panel to position ON.
— Check that display turns on indicating that power is on.

1.2. External battery

— Set switch MAINS EXT. BATT/INT. BATT at the rear panel to position MAINS EXT. BATT.
— Connect the cables from the external battery to sockets EXT. BATT. 12—28 V at the rear panel.
— Set DISPLAY TIME at the front panel control to position ON.
— Check that display turns on indicating that power is on.

1.3. Internal battery PM 9675

— Set switch MAINS EXT. BATT/INT. BATT. at the rear panel to position INT. BATT.
— Set DISPLAY TIME control at the front panel to position ON.
— Check that display turns on indicating that power is on. Blinking display indicates low voltages. Refer to manual PM 9673 for charging instructions.

2. Warm up time

The warm up time from the moment of mains connection is less than 7 minutes to an oscillator error of less than 10^{-7} for instruments equipped with the oven-enclosed oscillators PM 9679 and PM 9690. Instruments equipped with the oscillators PM 9677 or PM 9678 (TCXO) are ready for use at the moment of mains connection.
Normally the instrument is switched on from the STAND BY position. If so, no warm up time is needed, irrespective of which oscillator is employed.

3. External frequency standards

House standards or other frequency standards can be used instead of the internal 10 MHz oscillator.
If a time resolution of 100 ns is required, 10 MHz must be used. When using 1 MHz instead of 10 MHz the decimal point must be shifted one step to the left to interpret the display correctly. To set the counter to external standard the switch EXT. STD OUT VIA D/EXT. STD IN VIA D at the rear panel must be set to position EXT. STD IN VIA D.

4. Control settings

4.1. A, B and C inputs

The A and B amplifiers are identical in specification and provided with identical input controls.
The A input is normally used for frequency measurement and the B input for time measurement.
The C input is a prescaler input with automatic PIN-diode attenuator and mainly used for high frequency measurement.

4.2. AC and DC coupling

The AC/DC push-button controls the coupling of the input signal to the attenuator and the amplifier by switching a capacitor in series in the AC mode and by direct coupling in the DC mode.
A.C. coupling is normally used to block the d.c. component in signals which are superimposed on a d.c. voltage. The capacitor in series will, however, cause a falling sensitivity for low frequencies.
In waveforms where pulse width and repetition time vary the d.c. level will also vary. Change in the d.c. level will cause changes in the preset triggering level and make accurate time measurements impossible if A.C. coupled, in such cases the input should be D.C. coupled.
Normally frequency measurements are performed with an A.C. coupled input and time interval measurements with a D.C. coupled input.

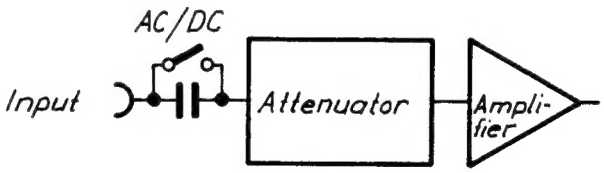


Fig. VI-1. AC/DC coupling

4.3. Attenuator and Trigger Level.

The TRIGGER LEVEL control allows continuous setting of the trigger level at any point of the input signal. For high amplitude signals the attenuator is used to expand the setting range.
However, input attenuation will decrease the sensitivity and cause bigger trigger errors.
For frequency measurements on sine wave and other symmetrical signals no level off-set is required. Pulled position of the TRIGGER LEVEL control sets the trigger level to 0 V for highest sensitivity.
However, for frequency measurement on narrow pulses a limited off-set voltage may be needed to obtain reliable triggering.
Time measurement requires continuously variable setting of the trigger level.
Monitor sockets for channel A and B provide the ability to measure the set trigger level.
If the attenuator is set to 200 mV the trigger level range is increased 10 times from ±2.5 V to ±25 V.

The name trigger level can be misleading, since triggering does not occur on the set trigger level but at the trigger point—see figure VI-2.

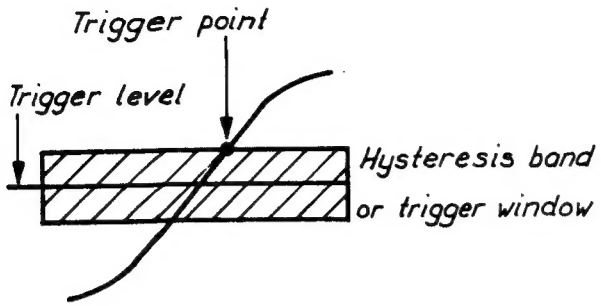


Fig. VI-2. Triggering

4.4. Separate and Common via B mode

In the SEP position the A and B inputs operate independently of each other in any operations irrespective of input sources. In the COM position the A input is disconnected from its attenuator and amplifier, and a signal connected to input B is coupled to both A and B attenuators and amplifiers.
All input specifications of input B will remain the same but the input impedance will be 500 kΩ shunted by 50 pF.

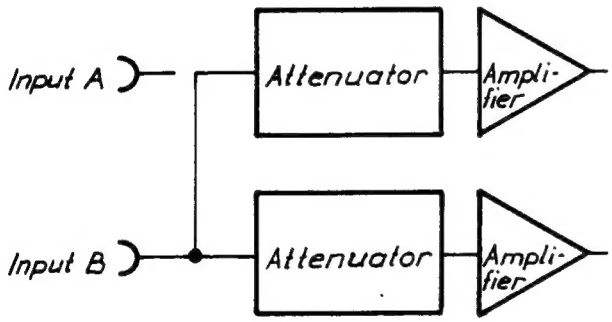


Fig. VI-3. COM via B mode

4.5. Positive and negative slope triggering
This push-button determines on which slope of the input signal the triggering will occur.
In released position the triggering will occur at the positive slope of the input signal and in depressed position it will occur on the negative slope.
Where on the slope the triggering will occur is determined by the TRIGGER LEVEL control.

Fig. VI-4. Positive and negative slope triggering

A simple way to measure the pulse width of a positive pulse is achieved by setting input A to positive slope and input B to negative slope, connect the pulse to input B, set FUNCTION SELECTOR to any of the two SINGLE positions, slide switch PERIOD B/TIME INT. A TO B to position TIME INT. A TO B and SEP/COM to COM.

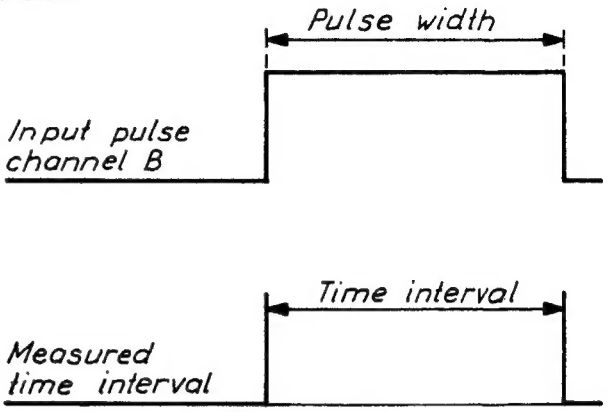


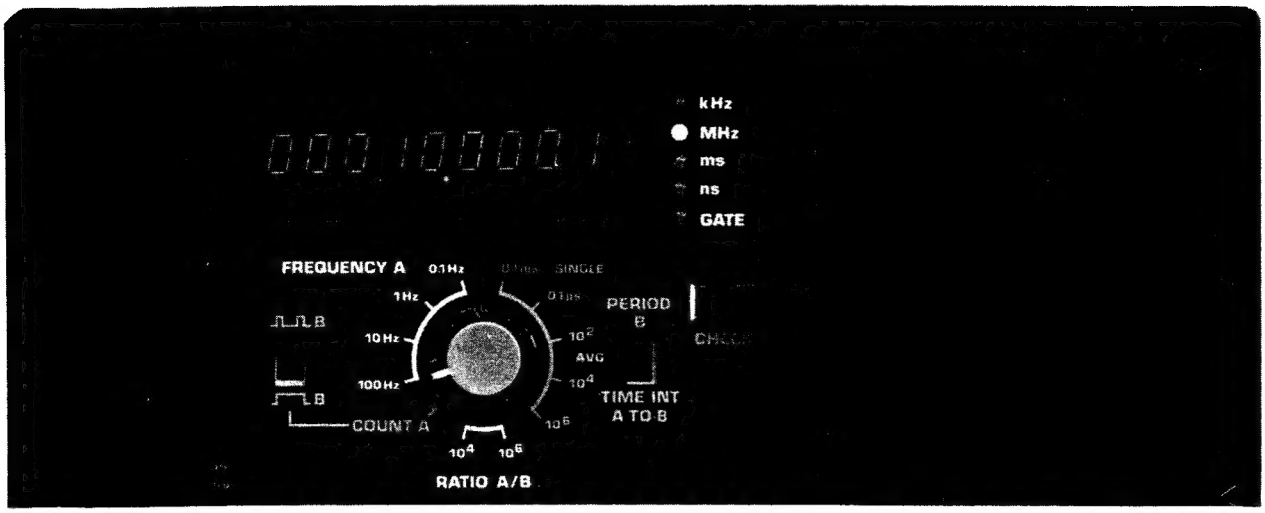
Fig. VI-5. Simple pulse width measurement

4.6. Hold off PM 6622

This control provides a delayed triggering of the instrument in single period and time interval measurement, this feature is used to avoid false triggering on noisy signals.

5. Basic measurements

5.1. CHECK PM 6622



Self check of the instrument.

— Depress CHECK push-button

— Rotate FUNCTION SELECTOR and read:

Frequency A

100 Hz	00010.0000
10 Hz	0010.00000
1 Hz	010.000000
0.1 Hz	10.0000000

— Set PERIOD B/TIME INT A TO B to PERIOD B

Period B

0.1 ms	00000000.0
0.1 ns	00000.0001
10^2	000000100
10^4	0000100.00
10^6	00100.0000

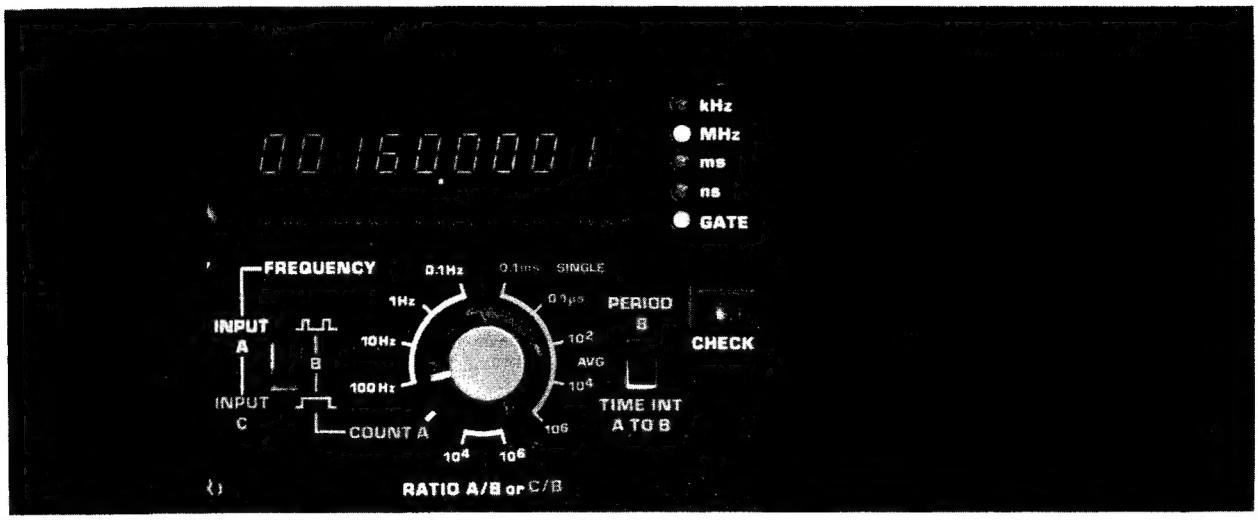
Ratio A/B

10^6	001.000000
10^4	00001.0000

Count A

Start/Stop	000000002
Gated	000000001

5.2. CHECK PM 6624 . . . 25



Self check of the instrument.

— Depress CHECK push-button
— Set INPUT A/INPUT C to INPUT A
— Rotate FUNCTION SELECTOR and read:

FREQUENCY A

100 Hz	00010.0000 MHz
10 Hz	0010.00000 MHz
1 Hz	010000.000 kHz
0.1 Hz	10000.0000 kHz

— Set PERIOD B/TIME INT A TO B to PERIOD B

PERIOD B

0.1 ms	00000000.0
0.1 ns	00000.0001
10^2	000000100
10^4	0000100.00
10^6	00100.0000

RATIO A/B

10^6	001.000000
10^4	00001.0000

— Set INPUT A/INPUT C to INPUT C

RATIO C/B PM 6624

10^4	008.000000
10^6	00008.0000

RATIO C/B PM 6625

10^4	016.000000
10^6	00016.0000

COUNT A

Start/Stop	000000002
Gated	000000001

FREQUENCY C PM 6624

100 Hz	00080.0000 MHz
10 Hz	0080.00000 MHz
1 Hz	080000.000 kHz
0.1 Hz	80000.0000 kHz

FREQUENCY C PM 6625

100 Hz	00160.0000 MHz
10 Hz	0160.00000 MHz
1 Hz	160000.000 kHz
0.1 Hz	60000.0000 kHz

5.3. Frequency A. PM 6622 . . . 25

Simple frequency measurement on sine waves and other symmetrical waveforms.

— Set FUNCTION SELECTOR to desired resolution

— Set INPUT A/INPUT C to INPUT A (only PM 6624 . . . 25)

— Set AC/DC to AC

— Pull TRIGGER LEVEL control

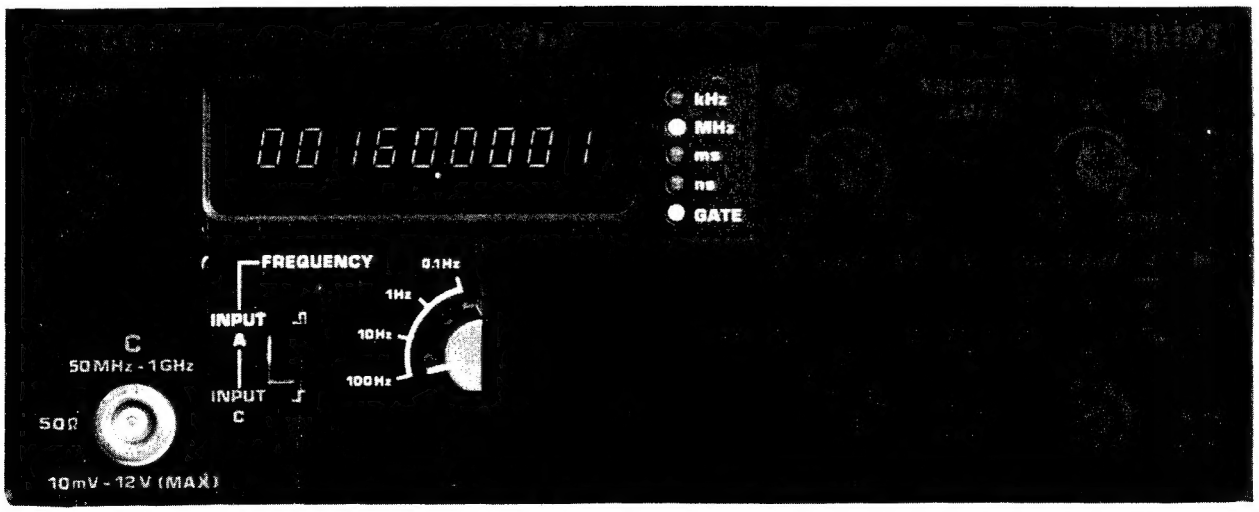
— Set SEP/COM to SEP

— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 1 V_{rms}

— Connect the input signal to input A

Display will show frequency in kHz or MHz

5.4. FREQUENCY C PM 6624 . . . 25



Automatic frequency measurement.

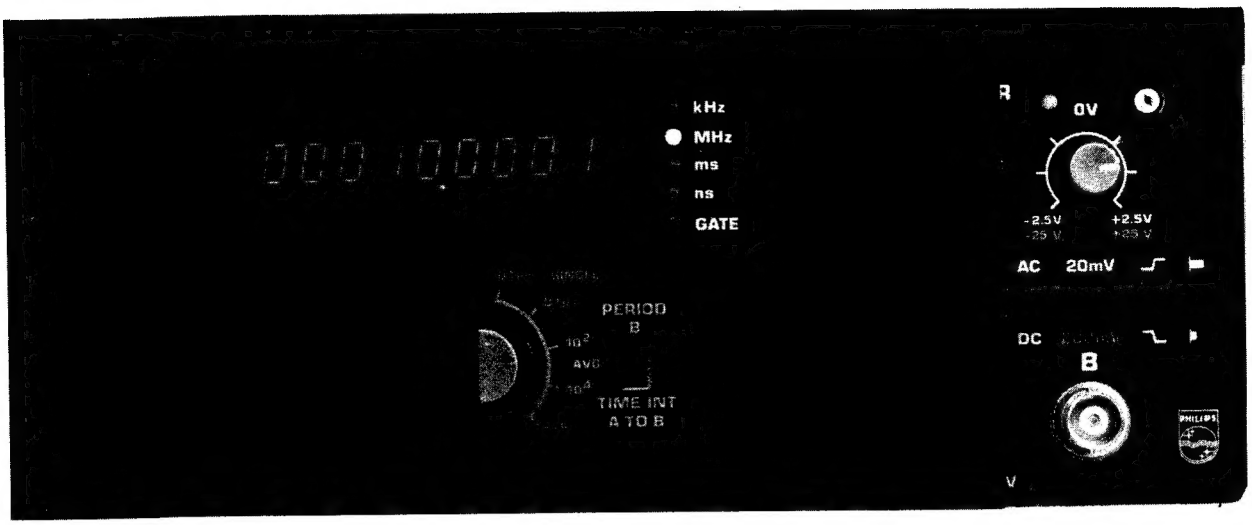
— Set FUNCTION SELECTOR to desired resolution

— Set INPUT A/INPUT C to INPUT C

— Connect the input signal to input C

Display will show frequency in MHz or kHz

5.5. PERIOD B PM 6622 . . . 25



Simple period measurement on sine waves and other symmetrical waveforms.

— Set FUNCTION SELECTOR to SINGLE or AVG measurement
— Set PERIOD B/TIME INT A TO B to PERIOD B
— Pull TRIGGER LEVEL
— Set AC/DC to AC
— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 1 V_{rms}
— Select positive slope triggering
— Connect the signal to input B

Display will show period time in ms or ns

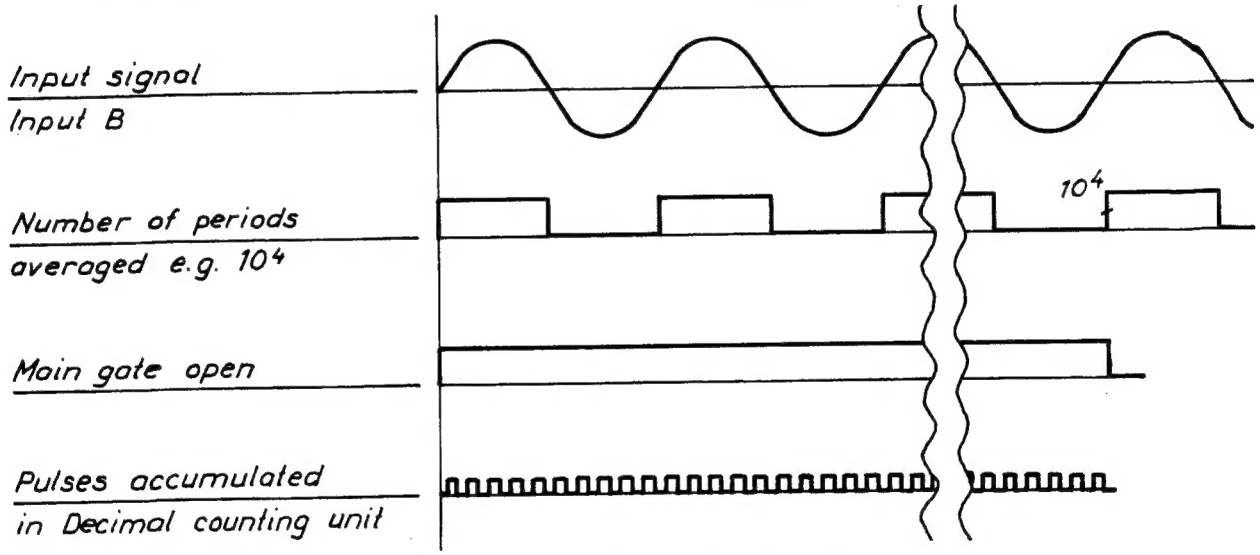


Fig. VI-6. Period average measurement

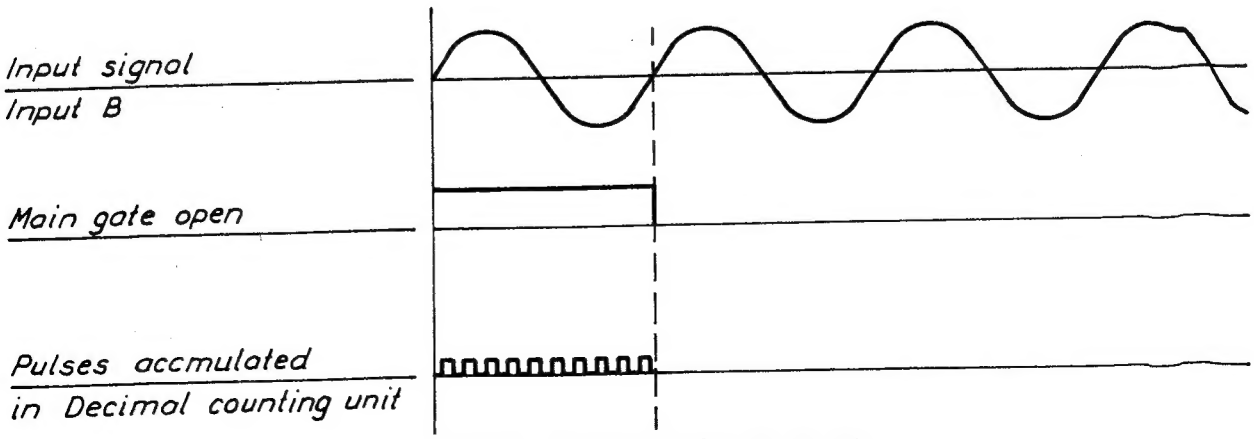


Fig. VI-7. Single period measurement

5.6. Time Interval A to B PM 6622 . . . 25

Simple measurement of time interval between pulses at input A and B from separate sources.

— Set FUNCTION SELECTOR to SINGLE or AVG

— Set PERIOD B/TIME INT A TO B to TIME INT A TO B

— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 3 $V_{p\text{-}p}$

— Set AC/DC to DC

— Set SEP/COM to SEP

— Select positive slope triggering

— Set TRIGGER LEVEL potentiometer to suitable trigger level e.g. 50 % of the pulse amplitude

— Connect the pulses to input A and B

Display will show the time interval in ms or ns

5.7. Ratio A/B PM 6622 . . . 25

Simple ratio measurement on sine wave or other symmetrical waveforms.

— Set FUNCTION SELECTOR to 10^4 or 10^6

— Pull TRIGGER LEVEL control

— Set AC/DC to AC

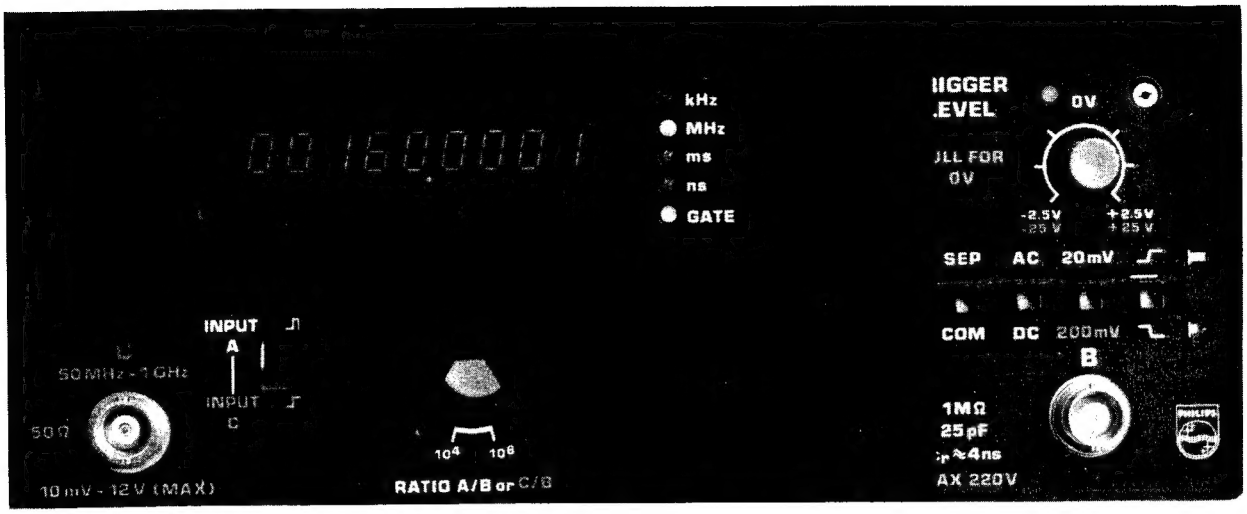
— Set SEP/COM to SEP

— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 1 V_{rms}

— Connect the signal with the highest frequency to input A and the other signal to input B

Display will show the ratio of the signal frequencies at input A and B

5.8. Ratio C/B PM 6624 . . . 25



Simple ratio measurement on sine wave and other symmetrical waveforms.

— Set FUNCTION SELECTOR to 10^4 or 10^6

— Set INPUT A/INPUT C to INPUT C

— Pull TRIGGER LEVEL control

— Set SEP/COM to SEP

— Set AC/DC to AC

— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 1 V_{rms}

— Connect the signal with the highest frequency to input C and the other to input B

Display will show the ratio of the signal frequencies at input C and B

5.9. Count A Start/Stop and Gated by B. PM 6622 . . . 25

Simple Start/Stop and Gated by B measurement on sine wave and other symmetrical waveforms.

— Set FUNCTION SELECTOR to COUNT A
— Pull TRIGGER LEVEL Control
— Set AC/DC to AC for channel A
— Set AC/DC to DC for channel B
— Set SEP/COM to SEP
— Set 20 mV/200 mV to 200 mV if the amplitude of the input signal is higher than 1 V_{rms}
— Select positive slope triggering
— Select Start/Stop by B (upper position) or Gated by B (lower position)
— Connect gating signal to input B and the other signal to input A

In Start/Stop operation the display will show the accumulated number of counts in the time interval between the Start/Stop signals, and in the Gated mode the accumulated number of counts during the positive and negative slopes of the Gating signal

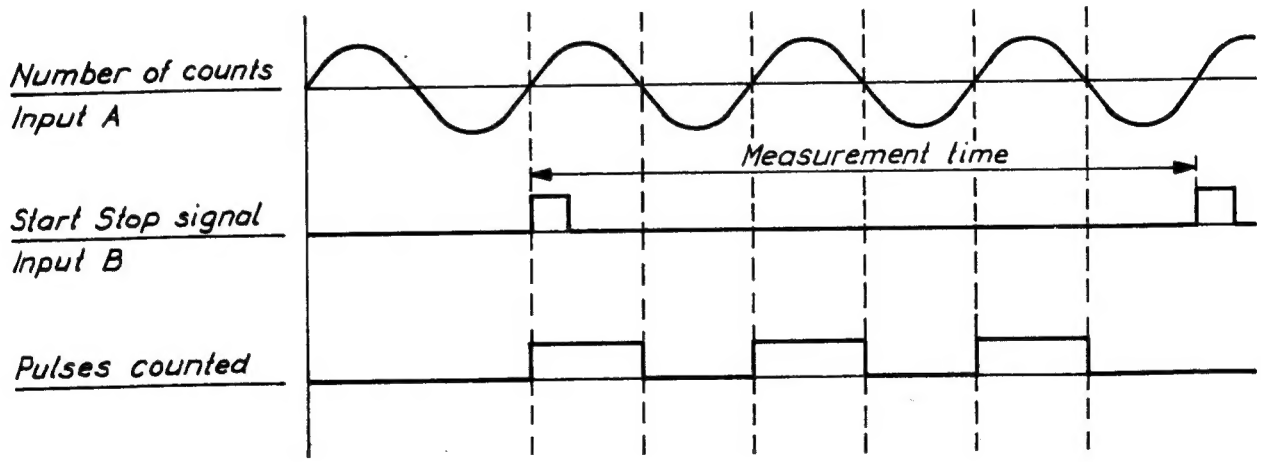


Fig. VI-8. Start/Stop by B measurement

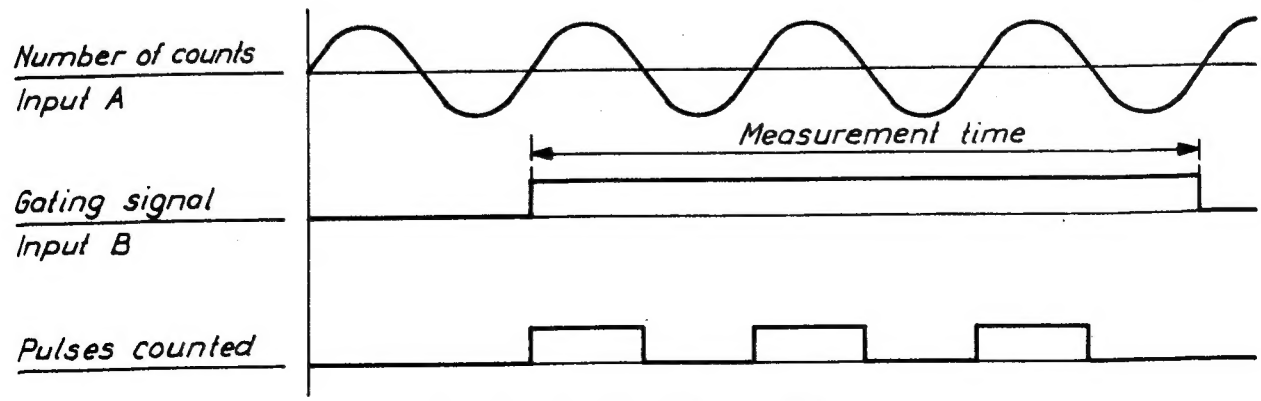
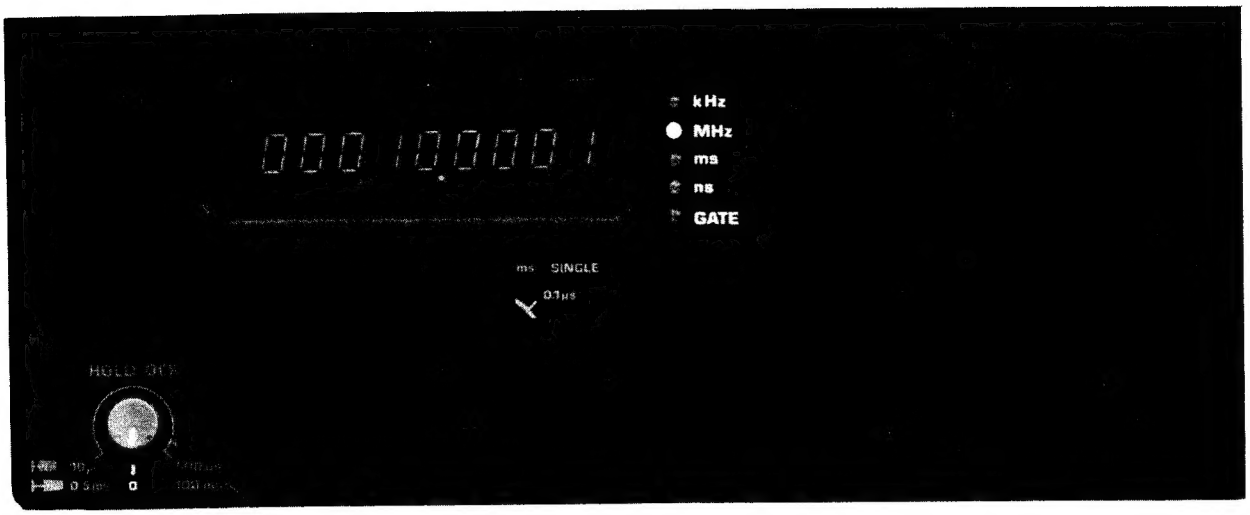


Fig. VI-9. Gated by B measurement

5.10. Hold off PM 6622



— Set FUNCTION SELECTOR to 0.1 µs and rotate HOLD OFF control from fully CCW to fully CW position

— Read hold off time from 0.01 to 0.5 ms on the display with knob pushed and 0.5 ms to 100 ms with knob pulled

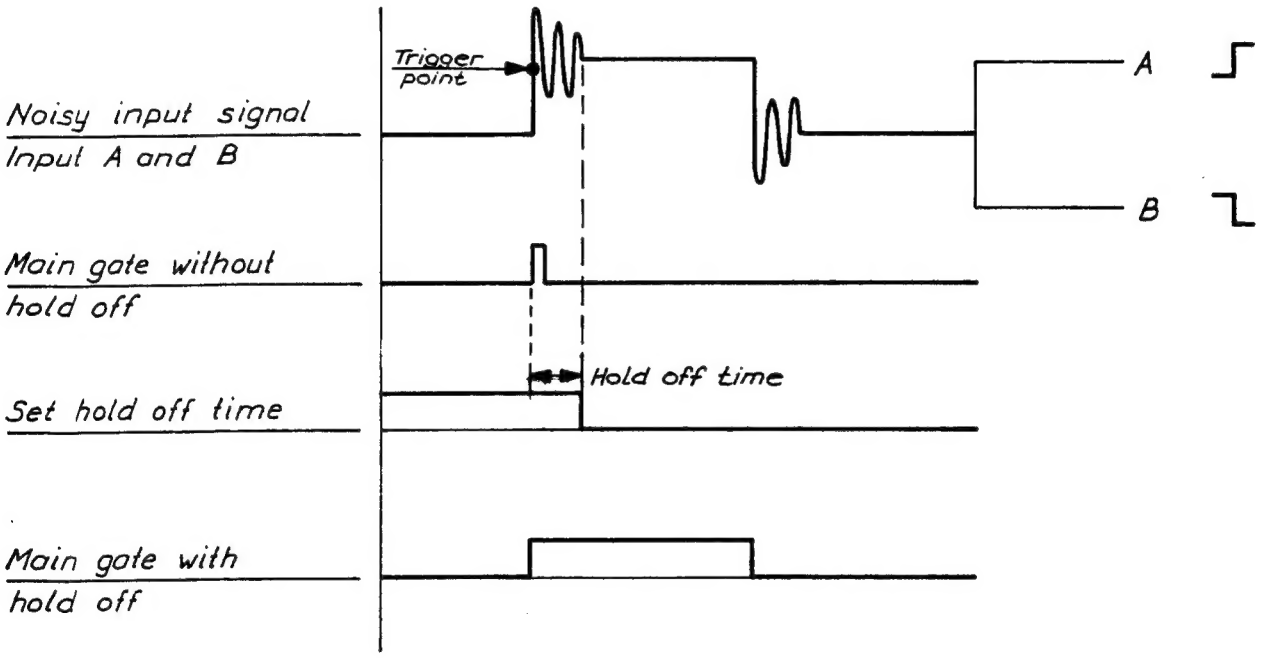


Fig. VI-10. Time interval measurement on noisy signals